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A new short daily brachytherapy schedule in postoperative endometrial carcinoma. Preliminary results

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ABSTRACT

PURPOSE: To evaluate the preliminary results of vaginal-cuff relapses (VCR) and complications of a short brachytherapy (BT) schedule in postoperative endometrial carcinoma.

METHODS AND MATERIALS: From September 2011 to December 2014, 102 patients were treated with postoperative BT for endometrial carcinoma. Seventy-four patients received a single 7 Gy dose after external beam irradiation (Group 1), and 28 intermediate-risk patients received three daily fractions of 6 Gy (Group 2). The dose was prescribed at 5 mm from the applicator surface. Toxicity was prospectively evaluated after the objective late effects of normal tissues-subjective, objective, management, analytic scores for vagina and RTOG scores for rectum and bladder. Statistics: χ^2 and Student's t tests.

RESULTS: The mean followup was 28.85 months (9.6−58.5) in Group 1 and 31.19 months (7.7−62.3) in Group 2. No VCR was found during followup. Late toxicity: vagina toxicity was developed in 24.32% of the patients in Group 1 (G1−G2) and in 21.4% in Group 2 (G1−G2 but 1 G3). Rectal toxicity appeared in only 2.7% of patients in Group 1 (G1). Neither Group 1 nor Group 2 presented late bladder toxicity. No differences were found in late toxicity between Groups 1 and 2.

CONCLUSIONS: The present short BT schedule was safe in relation to VCR and late toxicity for the followup period studied. These results are similar to those of two larger previous schedules performed in our center in relation to the same point of followup.

Keywords: High dose rate; Vaginal-cuff brachytherapy; Postoperative endometrial carcinoma

Introduction

Postoperative brachytherapy (P-BT) is a well-established treatment to decrease vaginal-cuff relapses (VCRs) from 15% to 2% or less in endometrial carcinoma (EC). Exclusive brachytherapy (BT) treatment is indicated in patients with intermediate-risk EC without bad prognostic factors (such as Type 2 EC, tumor size > 2 cm and the presence of vascular and lymphatic space invasion). The need for and the benefits of BT in the control of vaginal relapse and a reduction of late external beam radiation (EBI) effects have been demonstrated in this type of patient in the PORTEC-2 trial. In high-risk cases as well as Stage II and advanced stages of

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EC, most physicians also add BT to EBI. On the other hand, the role of chemotherapy in high-risk patients is currently under evaluation in several trials (1−5).

In the 90s, high-dose-rate (HDR) BT was introduced into the field of BT, and at present, this procedure is the most frequent type of BT used in gynecologic cancer. Several HDR BT schedules and doses have been reported by different authors, although few comparative studies of the different schedules have been published. Consequently, physicians working in this field use their own schedules based on their preferences, experience, and work load possibilities. The most recommended and widespread schedules in exclusive HDR BT treatment are 5 Gy × 4 fractions and 7 Gy × 3 fractions and two fractions of 5 Gy after EBI (dose prescription at 5 mm from the applicator surface). Moreover, although the administration of more than 2−3 fractions per week is not recommended, a few studies have shown no increase in complications with 4−5 fractions per week (shorter overall BT interval time) (2,6−10).

Our group has recently demonstrated similar results in local control and toxicities with six fractions (3−4 fractions/wk) of 4−6 Gy and four daily fractions of 5−6 Gy in exclusive P-BT and three fractions/wk of 4−6 Gy and two daily fractions of 5−6 Gy (11). To reduce the number of fractions while maintaining the benefits for the patient and health care costs, we reduced the daily schedule to six fractions of 6 Gy in exclusive treatment and one fraction of 7 Gy after EBI.

The aim of the present study was to evaluate the preliminary results of VCRs and complications of this short BT schedule in postoperative EC.

Methods

Study design and patients

From September 2011 to December 2014, 102 patients with intermediate- and high-risk and Stage II and advanced EC were treated with P-BT. Before surgery, patients underwent positron emission tomography/CT and/or MRI and/or CT and/or ultrasonography. Almost all the patients underwent MRI before surgery, positron emission tomography/CT was performed in patients with positive lymph nodes in imaging techniques. Surgery consisted in laparoscopic-assisted vaginal hysterectomy plus bilateral oophorectomy (HBO) and pelvic plus para-aortic laparoscopic lymphadenectomy in 33 patients and abdominal HBO and pelvic lymphadenectomy in 22 patients; vaginal HBO was performed in 10 patients, abdominal HBO and pelvic plus para-aortic lymphadenectomy in 8 patients, abdominal HBO and pelvic plus para-aortic lymphadenectomy and omentectomy in 7 patients, and other types of surgery in the remaining patients. After pathologic study, all the patients were referred to our Radiation Oncology Department for treatment. The FIGO 2009 stage and pathologic characteristics of the patients are shown in Table 1 (12).

Twenty-eight patients were classified as intermediate risk in need of exclusive BT (Group 1) and 74 received EBI plus BT (intermediate risk with vascular lymphatic space invasion and/or tumor size >2 cm, high-risk Stage I, Type 2 EC, II−VIB stages) (Group 2) (3,4,13).

Considering the age and comorbidities of these patients, only 20 patients with high-risk, Stage II, or advanced stages of EC received four to six schedules of carboplatin plus paclitaxel before EBI.

External beam radiation

After volume definition after the 2007 RTOG guidelines, 3D treatment planning was performed, and patients were treated with 6 or 18 MV photons from a Linac (14). The mean given dose was 45 Gy (range: 44−50.4) with a 1.8−2 Gy dose per fraction, five fractions/wk. In those cases with radiologic or pathologic staging of IIIC2, an extended field to D_{12} was performed.

Brachytherapy

In patients receiving exclusive BT, three daily fractions of 6 Gy were administered, and a single dose of 7 Gy was given after EBI. BT was administered by an HDR ^{192}Ir source and

Table 1
Age and pathologic characteristics of the patients

	EBI + BT (n = 74) (%)	Exclusive BT (28) (%)
Mean age	65.4 (SD 9.6)	66.7 (SD 9.0)
2009 FIGO stage		
IA	13 (17.6)	17 (60.7)
IB	28 (37.7)	11 (39.3)
II	8 (10.8)	
IIIA	4 (5.2)	
IIIB	1 (1.3)	
IIIC1	8 (10.8)	
IIIC2	5 (6.8)	
IVA	1 (1.3)	
IVB	6 (7.8)	
Pathology		
Endometrioid	54 (73.4)	27 (96.4)
Clear cells	6 (8.1)	0 (0)
Serous	10 (13.5)	1 (3.6)
Myometrial invasion		
No	0 (0)	1 (3.5)
<50%	25 (33.8)	15 (53.6)
≥50%	49 (66.2)	12 (42.9)
Grade		
1	6 (8.1)	13 (46.5)
2	31 (41.9)	14 (50.0)
3	37 (50.0)	1 (3.5)
Median tumor size	3.7 (SD 2)	3.4 (SD 1)
VLSI		
No	49 (66.2)	27 (96.4)
Yes	21 (28.4)	1 (3.6)
NA	4 (5.4)	0 (0)

BT = brachytherapy; EBI = external beam radiation; FIGO = International Federation of Gynecology and Obstetrics; SD = standard deviation; VLSI = vascular lymphatic space invasion.